5. On the Gravid Uterus and Placenta of *Hyomoschus aquaticus*. By Professors A. H. Garrod, M.A., F.R.S., and William Turner, M.B., F.R.S.

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(Plate XLIV.)

An adult female of *Hyomoschus aquaticus* having come into our hands, it was with no small pleasure that on eviscerating it we found it far advanced in pregnancy; for it enables us to give an account of the placenta, the nature of which has, till now, only been surmised from what is found in *Tragulus*.

In his valuable memoir on the Tragulidæ[1], M. Alphonse Milne-Edwards briefly describes and also figures the fœtus with the placenta of *Tragulus stanleyanus*. He makes no mention of the uterus, of which, in an allied species, John Hunter tells us[2] that it "soon divides into two horns, which are pretty large and not long, having none of the buttons for the cotyledons."

In his paper on the visceral anatomy of *Hyomoschus aquaticus*[3], Prof. Flower describes the female generative organs in the following words:—"The vagina was 5 inches in length; the uterus 3·5 inches to the point of bifurcation, sharply bent back on itself near the upper end, and terminated in a pair of rather short, closely curled cornua."

In our gravid specimen the single hairless fœtus which, from tip of nose to end of tail, measures 8·5 inches, the tail being an inch long, is lodged on the left side.

The uterus consists of two horns communicating with a common corpus uteri. The horns are united together in the greater part of their extent, not more than about 1·5 inch of the tip of each horn being free. The line of union is marked externally by a groove, and internally by a broad partition, the septum uteri, which extends longitudinally backwards and terminates in a well-defined semilunar free border, behind which the two horns are fused together into the common corpus uteri. The free ends of the cornua are curled backwards, and together with the Fallopian tubes and ovaries are situated upon the anterior part of the superior wall of the uterus. Owing to the fœtus being developed in the left horn, this cornu is much more dilated than the right; but the latter is considerably more capacious than in the non-gravid uterus. The corpus uteri communicates by a constricted os with a passage which may perhaps be regarded as a cervix, though some might look on it as only the specially modified anterior end of the vagina. This part of the genital passage is $1\frac{3}{4}$ inch long and very much constricted. Its mucous lining is longitudinally folded; and the folds are at intervals so projecting as to give the appearance of transverse constrictions. The passage and the os

[1] Annales des Sciences Naturelles, 5th series, vol. ii. 1864, pp. 49-167.
[2] 'Essays and Observations,' edited by Prof. Owen, 1861, vol. ii. p. 135.
[3] P. Z. S. 1867, p. 960.

Fig 1

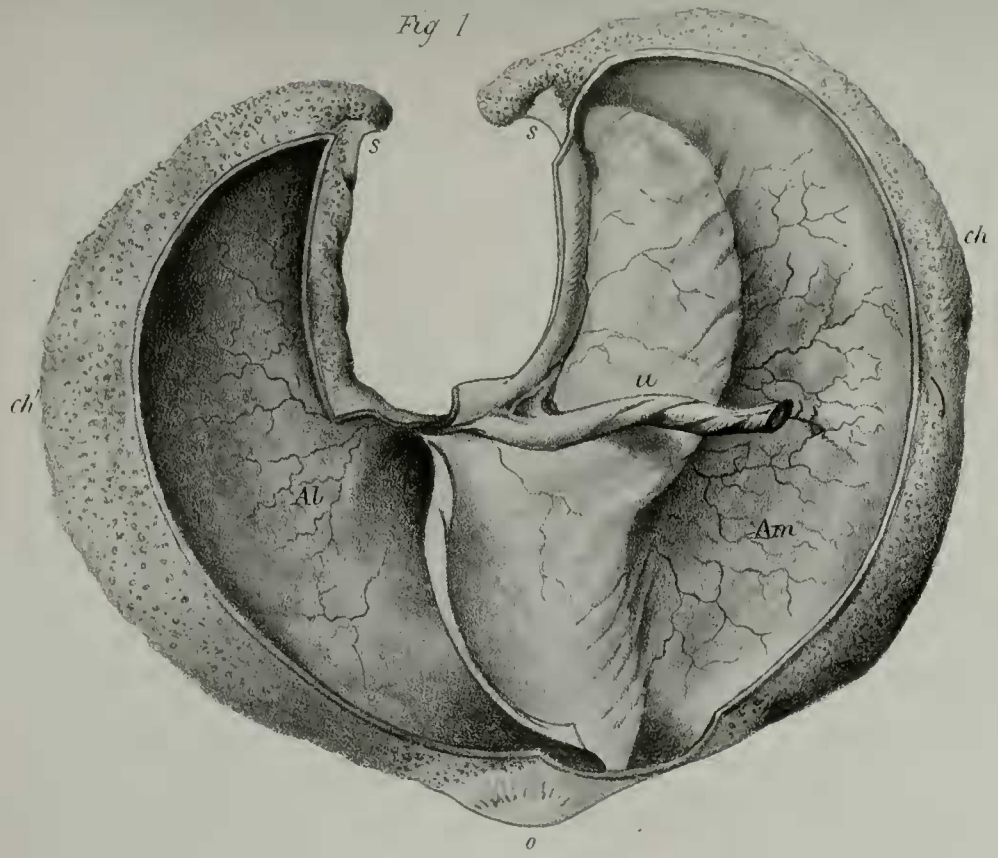
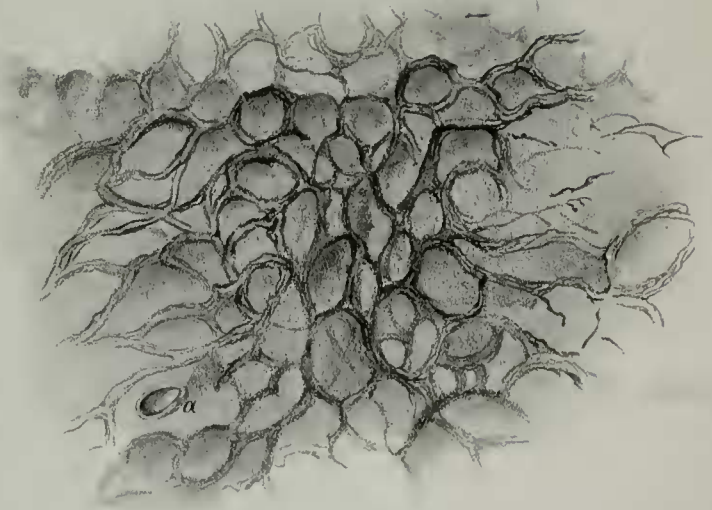


Fig 2



J. Smit lith

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ANATOMY OF HYOMOSCHUS

are blocked up by a whitish viscid mucus. Behind the most posterior transverse constriction the vagina undergoes a considerable dilatation, and the mucous lining exhibits faint longitudinal folds.

The uterine walls are slightly thinner than those of the human stomach. The cavity of the two cornua and of the corpus uteri is lined by a well-defined mucous membrane, from which the fœtal chorion can readily be separated. This mucous membrane forms the maternal portion of the diffused placenta characteristic of *Hyomoschus*. The mucosa of both cornua is not elevated into folds, except in close proximity to the openings of the corresponding Fallopian tubes; and the mucous lining of the corpus uteri is longitudinally folded only in proximity to the os uteri. The free surface of the mucous membrane, both in the cornua and corpus and on both surfaces of the septum uteri, is soft and velvety and pitted with multitudes of minute depressions just visible to the naked eye. These depressions are the crypts in which the villi of the chorion are lodged when the chorion is *in situ*. The crypts are distributed with almost equal regularity over the surface of the mucosa in the several divisions of the uterus; but on the more convex part of the impregnated left cornu the mucosa is not quite so thick, so that the crypts are shallower, and over a limited area the free surface of the mucous membrane is almost, if not quite, free from crypts. We did not, however, see any depressed circumscribed smooth areas surrounded by crypts such as one of us has described elsewhere [1] in the Pig and Lemurs, or polygonal areas occupied by crypts and bounded by ridges free from crypts, such as are to be seen in the gravid uterus of the mare. In the regular diffusion of the crypts over the surface of the mucosa, the gravid uterus of *Hyomoschus* much more closely resembled what has been described in *Orca gladiator* [2] than it did the uterine mucosa of the Pig, Mare, and Lemurs.

We then carefully stripped portions of the mucous membrane off the subjacent muscular coat, and soaked them in glycerine for some days, in order to render the membrane as translucent as possible. When the mucosa thus prepared was examined microscopically, the openings of the uterine glands on the surface of the membrane could be seen. Sometimes these openings were found on the slender raised folds of mucosa separating adjacent crypts from each other; at other times they opened into the crypts, and at other times on smoother portions of the membrane where the crypts were shallower or almost absent; but in no case were the mouths of the glands specially localized in smooth circumscribed areas of the mucosa, as is the case in the Pig and in the Lemurs. The gland-orifices were directed obliquely to the plane of the free surface of the membrane; and it was not uncommon to see an epithelial plug projecting through the mouth.

Additional views of the relation of the glands to the crypts were obtained by making vertical sections through the mucosa. This

[1] Turner, Lectures "On the Comparative Anatomy of the Placenta," Edinburgh, 1876, and Trans. Roy. Soc. London, 1876.

[2] Turner, Trans. Roy. Soc. Edinburgh, 1871.

membrane consisted of a gland layer and a crypt layer. The gland layer was next the muscular coat, and consisted of elongated tubular glands, somewhat tortuous and occasionally bifurcating. In the vertical sections the glands were cut across so that the tubes were sometimes transversely, at others obliquely, at others longitudinally divided, and here and there the stem of a gland could be seen passing obliquely through the crypt-layer to open on the surface in the manner already described. The glands were lined by a columnar epithelium, and possessed a central lumen. The glands were neither so numerous nor so distinct, neither did they bifurcate so frequently as do the utricular glands in the Pig and the Cetacea.

The crypt layer contained the numerous depressions already referred to for the lodgment of the villi of the chorion. The epithelium lining the crypts had, as a rule, disappeared; so that it was only in exceptional localities that it could be seen *in situ*, where it appeared to consist of cells, the type form of which was columnar, though modifications of that shape occurred. The subepithelial connective tissue contained a large proportion of corpuscles, some of which were fusiform, others polygonal, others of the rounded form of white blood-corpuscles. This tissue was more compact where it formed the walls of the crypts; but deeper in the mucosa, as it approached the glandular layer and the muscular coat, it had an areolated character. The vessels of the uterus were not injected; but there can be no doubt that, if they had been so, the walls of the crypts would have been seen to contain an abundant freely anastomosing network of capillaries, such as exist in the corresponding crypts in the Cetacea, the Mare, the Pig, and the Lemurs. In sections through the wall of the uterus, that had been stained with hæmatoxylin, a well-defined band, coloured with the blue pigment, marked the junction of the deep surface of the mucous membrane and its glands with the muscular coat. This band in all probability was the muscularis mucosæ. In *Hyomoschus*, as in other animals possessing a diffused placenta, the uterine glands have no relation, as regards numbers or termination, to the crypts. The crypts are infinitely more numerous than the glands, and are not to be regarded as formed by a dilatation of their mouths, but are new formations during pregnancy, due to hypertrophy and folding of the mucous membrane so as closely to adapt it to the irregular villous surface of the fœtal chorion.

The chorion extended from the tip of the left uterine cornu, through the corpus uteri, to the tip of the right uterine cornu. The left horn of the chorion, which contained the fœtus, was longer and much more capacious than the right horn. The tip of each horn of the chorion was in close relation to the orifice of each Fallopian tube; and close to the tip the free surface of the chorion was over a very limited area smooth and non-villous. That part of the chorion situated in the corpus uteri, immediately opposite the os uteri, presented a circular non-villous surface about the size of a shilling. This surface, though without villi, was folded so as to adapt it to the corresponding folds of the uterine mucosa in the same locality. A portion of